



Department of Transportation
Federal Aviation Administration
Office of Airworthiness
Washington, D.C.

TSO-C70a

Date 4/13/84

Technical Standard Order

Subject: TSO-C70a, LIFERAFTS (REVERSIBLE AND NONREVERSIBLE)

(a) Applicability.

(1) Minimum Performance Standards. This Technical Standard Order (TSO) prescribes the minimum performance standards that liferafts must meet to be identified with the applicable TSO marking. This TSO has been prepared in accordance with the procedural rules set forth in Subpart 0 of Federal Aviation Regulations (FAR) Part 21. New models of liferafts that are to be so identified and that are manufactured on or after the date of this TSO must meet the standards set forth in Appendix 1, "Federal Aviation Administration Standard for Liferafts," of this TSO.

(2) Environmental Standard. None.

(3) Test Methods. This TSO references Federal Test Method Standard No. 191A dated 7/20/78.

(b) Marking. In addition to the marking required in Federal Aviation Regulations (FAR) § 21.607(d) (14 CFR 21.607), the part number, serial number, date of manufacture, weight and rated and over-load capacities of the lifer-aft must be shown also. The weight of the liferaft includes any accessories required in this TSO.

(c) Data Requirements. In accordance with FAR § 21.605 (14 CFR 21.605), each manufacturer shall furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration, having geographical purview of the manufacturer's facilities, one copy each of the following technical data:

(1) Operating instructions.

(2) Packing instructions.

(3) A complete description of the device, including detail drawings, materials identification and specifications, and installation procedures.

(4) Manufacturer's TSO Qualification test reports.

DISTRIBUTION: ZVS-326;A-W(MS)-3;A-X(FES)-3;A-XX(CD)-44;AFFES-1,2,3,7,8(LTP);
A-FAC-0(MAX);AWN-1(2 copies)

(5) ~~Applicable~~ installation limitations, including ~~stowage~~ area ~~temperatures~~. The ~~manufacturer~~ shall also ~~provide~~ the ~~purchaser~~ with such limitations.

(6) Maintenance instructions ~~including~~ instructions ~~regarding~~ inspection, repair, and ~~stowage~~ of materials.

(7) ~~The functional test specification to be used to test each~~ production ~~article to ensure compliance~~ with this TSO.

(d) Availability of Referenced Documents.

(1) ~~Appendix 1~~; "Federal Aviation Administration ~~Standard~~ for Liferrafts," of this TSO specifies ~~certain~~ test methods that are contained in Federal Test Method Standard No. 191A unless otherwise noted. Federal Test Method Standard No. 19 1A may be examined at the FAA Headquarters in the Office of Airworthiness, Aircraft Engineering Division (AWS-1110), and at all Aircraft Certification Offices, and may be obtained (or ~~purchased~~) from the General Services Administration, Business Service Center, Region 3, 7th and D Streets, S.W., Washington, D.C. 20407.

(2) Federal Aviation ~~Regulations~~ Part 21, Subpart 0 and Advisory Circular 20-1110, Index of Aviation Technical Standard Orders may be re-viewed at the FAA Headquarters in the Office of Airworthiness, Aircraft Engineering Division (AWS-1110), and at all regional Aircraft Certification Offices.



J. A. Pontecorvo
Acting Director of Airworthiness

APPENDIX 1. ~~FEDERAL AVIATION ADMINISTRATION STANDARD FOR LIFERAFTS~~

1. Purpose. This standard provides the ~~minimum~~ performance standards for liferafts.

2. SCOPE. This standard covers the **following** types of liferafts:

TYPE I - For use in any category aircraft.

TYPE II - For use in ~~nontransport~~ category aircraft.

3. Materials and Workmanship.

3.1 Nonmetallic Materials.

3.1.1 The finished device **must** be clean and free **from** any defects that might affect its function.

3.1.2 Coated fabrics and other item, such as webbing, subject to deterioration **must** have been ~~manufactured not more~~ than **18 months** prior to the date of delivery of the finished product.

3.1.3 The materials **must not** support fungus growth.

3.1.4 Coated fabrics - General. Coated fabrics, including seam, subject to deterioration used in the manufacture of the devices **must** possess at least **90** percent of their original physical properties after these fabrics have ~~been~~ subjected to the accelerated **ageing** test specified in paragraph 6.1 of this standard. Material used in the construction of flotation chambers and **decks must be** capable of withstanding the ~~detrimental~~ effects of ~~exposure~~ to fuels, oils and hydraulic fluids.

3.1.4.1 Strength. Coated fabrics used for these applications ~~must conform~~ to the **following minimum** Strengths **after ageing:**

Tensile Strength (Grab Test)

Warp **190 pounds/inch**

Fill **190 pounds/inch**

Tear Strength

Trapezoid Test: **13 x 13 pounds/inch (minimum);; or**

Tongue Test: **13 x 13 pounds/inch (minimum)**

3.1.4.2 Adhesion. In addition to the requirements of 3.1.4.1, coated fabrics **must** met the following ~~minimum~~ strengths after ageing:

Ply Adhesion -

5 pounds/inch width at **70 ± 2 degrees F** at a **pull** rate of **2.0** to **2.5** inches/minute

Coat Adhesion -

5 **pounds/inch** width at **70 ± 2 degrees F** at **2.0** to **2.5** inches/minute

3.1.4.3 Permeability. For ~~coated~~ fabrics used in the manufacture of inflation chambers, the ~~maximum~~ permeability to helium (Permeability Test Method) ~~my~~ **not** exceed 10 liters per square meter in 24 hours at 77 degrees F, or its equivalent using hydrogen. The ~~permeameter~~ must be calibrated for the gas used. In lieu of this permeability test, an alternate test may be used provided the **alternate** test has been approved as an equivalent to this permeability test by the manager of the ~~FAA~~ office to which this TSO data is to ~~be~~ submitted, as required in Paragraph (c), Data Requirements.

3.1.5 Seam Strength and Adhesives. Cemented ~~or~~ heat sealable seams used in the manufacture of the device **must** met the following minimum strength requirements:

Shear Strength (Seam Shear Test Method) - 175 pounds/inch width at 75 degrees F
40 pounds/inch width at 140 degrees F

Peel Strength (Peel Test Method) -
5 pounds/inch width at 70 degrees F

3.1.6 Seam Tape. If tape is used for seam reinforcement or abrasion protection of seams **or both**, the tape **must** have a minimum breaking strength (Grab Test Method) of 40 pounds/inch width in both the warp and fill directions. When applied to the seam area, the adhesion strength characteristics **must** meet the seam strength requirements in paragraph 3.1.5.

3.1.7 Canopy. Fabrics used for this purpose **must** be waterproof and resistant to sun penetration, **must not** affect the potability of collected water, and **must** met the following minimum requirements in the applicable tests prescribed in paragraph 6.1 of this standard, except that in lieu of meeting the tensile strength requirements, a fabricated canopy may be demonstrated to withstand 35-knot winds and 52-knot gusts:

Tensile Strength (Grab Test)
Warp 75 pounds/inch
Fill 75 pounds/inch

Tear Strength
Trapezoid Test: 4 x 4 pounds/inch; or
Tongue Test: 4 x 4 pounds/inch

Coat Adhesion of Coated Fabrics
3.5 pounds/inch width at 70 + 2 degrees F at a separation rate of 2.0 to 2.5 inches/minute

3.1.8 Flammability. The device (including carrying case or storage container) **must be constructed** of materials which met FAR § 25.853 (14 CFR 25.853) in effect on May 1, 1972, as follows: Type I rafts **must** met § 25.853 (b) and Type II rafts **must met** § 25.853 (b-3).

3.1.4.3 Permeability. For ~~coated~~ fabrics used in the manufacture of inflation chambers, the ~~maximum~~ permeability to helium (Permeability Test Method) ~~may not~~ exceed 10 liters per square meter in 24 hours at 77 degrees F, or its equivalent using hydrogen. The ~~permeateer~~ must be calibrated for the gas used. In lieu of this permeability test, an alternate test may be used provided the ~~alternate~~ test has been approved as an equivalent to this permeability test by the manager of the ~~FAA~~ office to which this TSO data is to be submitted, as required in Paragraph (c), Data Requirements.

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3.1.8 Flammability. The device (including carrying case or storage container) ~~must be constructed of materials which meet FAR § 25.853 (14 CFR 25.853)~~ in effect on May 1, 1972, as follows: Type I rafts ~~must~~ meet § 25.853 (b) and Type II rafts ~~must meet~~ § 25.853 (b-3).

4.1.1.2.4 Except as provided below, all participants **must** select their sitting space without placement assistance. Instructions, either identified on the raft or announced prior to the demonstration, may be used informing that each participant should have a back support. A raft commander, acting in the capacity of a crewmember, may direct occupant seating to the extent necessary to achieve reasonable weight distribution within the raft.

4.1.1.2.5 All participants **must** not have practiced, rehearsed, or have had the demonstration procedures described to them within the past 6 months.

4.2 Buoyancy. An average occupant weight of not less than 170 pounds must be used in all applicable calculations and tests specified herein. In tests, ballast in the form of sand bags or equivalent may be used to achieve the 170 pound average, provided the appropriate weight distribution within the raft is maintained.

4.2.1 Type I Liferaft. Buoyancy must be provided by two independent buoyancy tubes each of which, including the raft floor, must be capable of supporting the rated and overload capacities in fresh water if the other tube is deflated. The liferaft loaded to its rated capacity must have a freeboard of at least 12 inches with both buoyancy tubes at minimum operating pressure. The liferaft loaded to its rated capacity with the critical tube deflated and the remaining tube at minimum operating pressure must have a freeboard of at least 6 inches. The liferaft loaded to its overload capacity with the critical tube deflated must have a measurable freeboard.

4.2.2 Type II Liferaft. When single tube construction is used to provide the buoyancy, internal bulkheads must divide the flotation tube into at least two separate chambers such that the liferaft will be capable of supporting the rated number of occupants in fresh water in the event that one chamber is deflated. The complete liferaft loaded to its rated capacity must have a freeboard of at least 6 inches.

4.3 Inflation. The inflation system must be arranged so that failure of one inflatable chamber or manifold will not result in loss of gas from the other chambers. The inflation equipment must be located so as not to interfere with boarding operations. Components of the inflation system must meet Department of Transportation Specification 3AA (49 CFR 178.37) or Specification 3HT (49 CFR 178.44) in effect May 30, 1976, as applicable, or an equivalent approved by the manager of the FAA office to which this TSO data is to be submitted, as required in paragraph (c), Data Requirements. The inflation system must be constructed to minimize leakage due to back pressure after inflation. If an air aspirator system is used, the system must be constructed either to prevent the ingestion of foreign objects or to prevent failure or malfunction as a result of ingestion of small foreign objects. For Type I liferafts, there must be an independent inflation source for each primary flotation tube, except that there may be a single inflation source for all flotation tubes if data substantiating the reliability of the single inflation source is approved by the manager of the FAA office to which this TSO data is to be submitted, as required in Paragraph (c), Data Requirements.

4.4 Liferaft Canopy A canopy ~~must be~~ packed with or attached to the raft. The erected canopy ~~must be~~ capable of withstanding 35-knot winds and 52-knot gust in open water. The canopy ~~must~~ provide adequate headman and ~~must~~ have provision for openings 180 degrees apart. Means ~~must be~~ provided to make the openings weathertight. If the canopy is not integral with the raft, it ~~must~~ be capable of being erected by occupants following conspicuously posted, ~~simple~~ instructions. It ~~must~~ be capable of being erected by one occupant of an otherwise empty raft and by occupants of a raft filled to rated capacity. For a reversible raft, attachment provisions ~~must~~ be installed to permit the canopy to be installed on either side of the raft.

4.5 Capsize Resistance - There ~~must be~~ water pockets or other means to provide capsize resistance for an empty or lightly loaded liferaft.

4.6 Boarding Aids. For Type I liferafts, boarding aids ~~must~~ be provided at two opposing positions on the raft. One boarding aid is sufficient for a Type II liferaft. Boarding aids ~~must~~ permit unassisted entry from the water into the unoccupied raft and ~~must~~ not at any time impair either the rigidity or the inflation characteristics of the raft. Puncturing of inflatable boarding aids ~~must not~~ affect the buoyancy of the raft buoyancy chambers. Boarding handles and/or stirrups used in conjunction with the boarding aids ~~must~~ withstand a pull of 500 pounds.

4.7 Righting Aid(s). Means ~~must~~ be provided to right a nonreversible liferaft if it inflates in an inverted position. The means provided for righting ~~must~~ be such that they may be used by one person in the water.

4.8 Lifeline. A nonrotting lifeline of contrasting color and at least 3/8-inch diameter or 3/4-inch width ~~must~~ encircle the liferaft on the outside periphery so that it can be easily grasped by persons in the water. The lifeline and its attachment ~~must~~ be capable of withstanding a minimum load of 500 pounds and ~~must~~ not interfere with the liferaft inflation.

4.9 Grasp Line. A grasp line, meeting the size and strength requirements for the lifeline, ~~must~~ be provided with sufficient slack for use by liferaft occupants to steady themselves when seated on the liferaft deck with their backs to the main flotation tube(s).

4.10 Color. The color of the liferaft's surfaces, including the canopy surface, visible from the air ~~must~~ be an International Orange-Yellow or an equivalent high visibility color.

4.11 Placards. Suitable placarding ~~must~~ be provided in contrasting colors in waterproof paint which is not detrimental to the fabric, that denotes use and location of the inflation system, raft equipment, boarding aids, and righting aids. For reversible rafts, placement of the placards

~~must~~ take into account usage of either side of the raft. The letters ~~used~~ for such placarding ~~must be~~ at least 2 inches high except that details and miscellaneous instructions may be of smaller lettering. Applicable placarding ~~must~~ take into account persons boarding or righting the raft from the water.

4.12 Lights. One or more survivor locator lights ~~must be~~ provided that are approved under ~~TSO-C85~~. The lights ~~must be~~ automatically activated upon raft inflation in the water, and visible from any direction by persons in the water.

4.13 Raft Sea Performance. The raft ~~must meet the~~ seaworthiness requirements in 6.2.3.2 and ~~must~~ be capable with its equipment of withstanding a saltwater marine environment for a period of at least 15 days.

5. Liferaft Equipment. All lines ~~must~~ be suitably stowed and secured to prevent entanglement during launching/inflation of a liferaft.

5.1 Mooring Line. A nonrotting mooring line at least 20 feet in length ~~must~~ be attached at one end to one end of the raft, with the remainder of the line held flaked to the carrying case (See 5.2). The mooring line ~~must~~ be capable of keeping the raft, loaded to maximum rated capacity, attached to a floating aircraft, and not endanger the raft or cause the raft to spill occupants if the aircraft sinks. The line may be equipped with a mechanical release linkage. The breaking strength of the line ~~must~~ be at least 500 pounds, or 40 times the rated capacity of the raft, whichever is greater, but need not exceed 1,000 pounds.

5.2 Liferaft Launching Equipment. A parachute ripcord grip and retaining pocket ~~must~~ form the primary inflation control. The ripcord grip or the attached static mooring line ~~must~~ be provided with means for attachment to the aircraft. If the ripcord grip is designed to attach to the aircraft, its strength may not be less than that of the static mooring line. The position of the ripcord grip ~~must be~~ standardized. When facing the release end of the carrying case, the center line of the ripcord grip retaining pocket ~~must~~ lie at 45 degrees in the right upper quadrant of the end section. The outermost extremity of the ripcord grip may not extend beyond the outer margin of the carrying case. The line attached to the ripcord grip ~~must~~ serve both to retain the liferaft and to actuate the gas release(s). The tension required to withdraw the static mooring line and to actuate the gas release mechanism(s) ~~must be~~ between 20 and 30 pounds. The strength of the gas release mechanism(s), its fittings, and its attachments ~~must not~~ be less than 100 pounds.

5.3 Sea Anchor. A sea anchor, or anchors, or other equivalent means ~~must be~~ provided to maintain the raft, with rated capacity and canopy installed, on a substantially constant heading relative to the wind and have the ability to reduce the drift to 2 knots in 17 to 27 knot winds.

Unless analysis and/or test data substantiating the adequacy of a **lower** breaking strength is approved **by** the manager of the FAA office to which this **TSO** data is to be submitted as required in paragraph (c), **Data Requirements**, the line securing a sea anchor **to** the raft **must** have a breaking strength of **500** pounds or **40** pounds times the rated capacity of the raft, whichever is greater. The attachment of the line to the raft must be capable of withstanding a load of **1.5** times the line rated strength without damaging the raft. The line **must** be at least **25** feet in length and must **be** protected to prevent it **from** being cut inadvertently by raft occupants !

5.4 Heaving-Trailing Line. At least **one** floating heaving-trailing line not less than **75** feet in length for **Type I** rafts and **not** less than **35** feet in length for **Type II** rafts, and at least **250** pounds strength, **must** be located **on** the main flotation tube near the sea anchor **attachment**. The attach point of the line **must** withstand a **pull** of **not** less than **1.5** times the line rated strength without damage to the raft. A heaving-trailing line must be accessible in any inflated position of a reversible liferaft.

5.5 Emergency Inflation. Means readily accessible to occupants of the raft, and having a displacement of at least **32** cubic inches per full stroke, must be provided to manually inflate and **maintain** chambers at **minimum operating** pressure. Manual inflation valves, with a **nonreturn** opening **adequate** for the size and capacity of the inflation **means**, must be located to permit inflation of all chambers. The location **must** take into consideration occupancy of each side of reversible raft. The inflation means and valves **must** have provisions to prevent inadvertent **removal** and loss when either stowed or in use.

5.6 Accessory Case Tiedowns. Provisions **must** be made for **tiedowns** to hold any accessory case. Each accessory case **tiedown must withstand** a **pull** of **250** pounds.

5.7 Carrying Case. A carrying case which **meets** the **flammability requirements** of this standard and which properly fits the packed **liferaft** must be provided. Carrying case **materials must** be of a highly visible color, be fungus proof, and **be** resistant **to** aircraft fuels and other fluids. The carrying case **must** provide chafe protection **to** the liferaft. The carrying case **must be** provided with easily distinguishable handles so that it may be carried by one person, carried by two persons in tandem, or dragged by either end; **none** of these carrying **operations must** tend to **pull** the carrying case open. Each handle must be easily grasped and its strength **must** be at least four **times** the total weight of the **liferaft** and case. Conventional zippers **may not be employed** for closure. **Location** of and instructions for use of the inflation handle **must** be clearly identified and marked on the carrying case surface.

5.8 Knife. A hook type knife secured by a retaining line **must be** sheathed **and attached** to the **liferaft** adjacent to the point of **mooring** line attachment.

6. Tests.

6.1 Material Tests. The ~~material~~ tests required in paragraph 3 of this standard ~~must be~~ determined in accordance with the following test ~~methods~~ or approved equivalent ~~methods~~:

<u>Test Method</u>		
<u>Test Required</u>	Federal Test Method Standard No. 191A dated July 20, 1978	<u>Notes</u>
Accelerated Age	Method 5850	Per Note (1)
Tensile Strength (Grab Test)	Method 5100	
Tear Strength (Trapezoid Test)	Method 5136(4)	
Tear Strength (Tongue Test)	Method 5134 (Alternate to Trapezoid Test. See 3.1.4.1)	
Ply Adhesion	Method 5960	
Coat Adhesion	Method 5970	
Permeability	Method 5460(4)	
Seam Shear Strength		Per Note (2)
Seam Peel Strength	Method 5960	Per Note (3)

NOTES:

(1) Samples for the accelerated ~~ageing~~ test ~~must~~ be exposed to a ~~temperature~~ of **158** + 5 degrees Fahrenheit for ~~not~~ less than **168** hours. After ~~exposure~~, the ~~samples must~~ be ~~allowed~~ to cool to **70** + 2 degrees Fahrenheit for ~~neither~~ less than **16** hours ~~nor more~~ than **96** hours ~~before~~ determining their physical properties in accordance with paragraph **3.1** of this standard.

(2) Each sample shall consist of ~~two~~ strips 2 inches ~~maximum~~ width by **5 inches maximum** length bonded together with an overlap of **3/4** inch ~~maximum~~. The free ends ~~must~~ be placed in the testing machine described in Method **5100** and separated at a rate of **12** + **0.5** inches per minute. The average value of ~~two samples must~~ be reported. ~~%Samples may be multilayered~~ as required to provide adequate strength ~~to~~ ensure against premature ~~material~~ failure.

(3) Separation rate must be **2.0** to **2.5** inches per minute.

(4) Federal Test Method Standard No. **191** in effect December **31, 1968**.

6.2 Liferaft Tests.

6.2.1 Pressure Retention. Under static conditions and when inflated and ~~stabilized at~~ the nominal ~~operating~~ pressure, the pressure in each inflatable chamber ~~must~~ not fall ~~below~~ the ~~minimum operating~~ pressure in less than ~~24 hours~~. The ~~minimum operating~~ pressure is the pressure required to met the minim design ~~buoyancy~~ requirements of paragraph 4.2 of this standard.

6.2.2 Overpressure Tests.

6.2.2.1 The device ~~must~~ be shown by test to withstand a pressure at least ~~1.5 times~~ the ~~maximum~~ operating pressure for at least 5 minutes without sustaining damage.

6.2.2.2 At least one specimen of the inflatable ~~device~~ model ~~must~~ be ~~shown~~ by test to withstand a pressure at least 2 times the ~~maximum~~ operating pressure without failure. Devices so tested ~~must be~~ clearly identified.

6.2.3 Functional Tests. Each ~~liferaft model must~~ pass the following tests:

6.2.3.1 Water tests. In either a ~~controlled~~ pool or fresh water, the ~~liferaft~~ capacity and ~~buoyancy must be demonstrated~~ as follows:

6.2.3.1.1 Both rated and overload capacities established in accordance with the requirements of paragraph 4.1 of this standard ~~must be demonstrated~~ with inflation tubes at ~~minimum~~ operating pressure and with the critical ~~buoyancy~~ chambers deflated. The resultant freeboard in each case ~~must~~ met the ~~requirements~~ of paragraph 4.2 of this standard,

6.2.3.1.2 Persons used in the demonstration ~~must~~ have an average weight of ~~not~~ less than 170 pounds. Ballast in the form of sand bags or equivalent my be used to achieve proper loading provided the appropriate weight distribution within the slide/raft is ~~maintained~~.

6.2.3.1.3 Persons used in the ~~demonstration must~~ wear life preservers with at least ~~one~~ chamber inflated.

6.2.3.1.4 The required ~~liferaft equipment,~~ including ~~one emergency~~ locator transmitter or a weight ~~simulating~~ a transmitter, ~~must be aboard~~ the liferaft.

6.2.3.1.5 It ~~must be demonstrated~~ that the ~~liferaft~~ is self-righting, or can be righted ~~by one~~ person in water, or while inverted can be boarded and provide flotation for the ~~normal~~ rated capacity.

6.2.3.1.6 It ~~must be~~ demonstrated that ~~the~~ boarding aids are adequate for the ~~purpose~~ intended and that it is ~~possible~~ for an adult wearing an inflated life preserver to board the ~~liferaft~~ unassisted.

6.2.3.2 Sea Trials. The ~~liferaft must~~ be demonstrated by tests ~~or~~ analysis, or a ~~combination~~ of both, to ~~be~~ seaworthy in an ~~open~~ sea condition of ~~17 to 27 knot~~ winds and waves of 6 to ~~10~~ feet. In tests, ballast in the form of sand bags or equivalent may be used to ~~achieve~~ proper loading provided the appropriate weight distribution within the raft is ~~maintained~~. If analysis is used, the analysis ~~must be~~ approved by the manager of the FAA office to which the TSO data is to be submitted as required in paragraph ~~(c)~~ **1, Data Requirements**. For this seaworthiness demonstration, the ~~following~~ apply:

6.2.3.2.1 The ~~liferaft must~~ be deployed to ~~simulate~~ deployment from an aircraft under the ~~most~~ adverse wind direction and wave condition. If the ~~liferaft~~ is an aspirated inflated type, it ~~must be demonstrated~~ that water ingested ~~during~~ inflation will ~~not~~ cause the raft to fail to ~~meet~~ the requirement for ~~bouyancy~~ under rated capacity in **4.2**.

6.2.3.2.2 All required equipment ~~must be~~ aboard and the proper functioning of each item of equipment ~~must be demonstrated~~.

6.2.3.2.3 The canopy ~~must be~~ erected for a sufficient ~~time~~ to assess its resistance to tearing and the protection it affords. The ~~method~~ of erection ~~must be shown~~ to be ~~accomplished~~ by me occupant of an otherwise ~~empty liferaft~~ and ~~by occupants~~ of a ~~liferaft~~ filled to rated capacity.

6.2.3.2.4 The stability of the ~~liferaft must~~ be demonstrated when occupied at normal rated capacity and at ~~50~~ percent rated capacity.

6.2.3.3 Liferaft Drop Test. A ~~complete liferaft~~ package must be dropped or thrown ~~from~~ a height of 5 feet ~~onto~~ a hard surface floor after which it ~~must be~~ inflated and ~~meet~~ the pressure retention requirements of paragraph **6.2.1** of this standard.

6.2.3.4 Portability Test. If the ~~liferaft~~ is to be manually ~~deployed~~, it ~~must be demonstrated~~ that the ~~complete liferaft~~ package can be ~~moved from~~ a typical ~~stowage~~ installation ~~by no more~~ than two persons and then deployed at another suitable exit.

6.2.3.5 Carrying Case. It ~~must be demonstrated~~ at least ~~10 times~~ that the carrying case ~~will open~~ satisfactorily and cause ~~no~~ & lay in the ~~deployment~~ and inflation of the liferaft.

6.2.3.6 Gas Cylinder Releases. It ~~must~~ be demonstrated that pulling the ~~rip cord~~ grip ~~from~~ any position will actuate the primary gas release(s).

6.2.5 Temperature Exposure and Inflation. ~~The manufacturer~~ shall determine the minimum temperature at which the ~~complete liferaft~~ assembly with its inflation ~~bottles~~, will be "rounded out" (i.e., attain its design shape and approximate ~~dimensions~~) so that the ~~liferaft~~ will be able to receive and to support the first occupant within one minute after the start of inflation. Thereafter, the rate of inflation ~~must~~ progress in such a manner and rate as to ensure a serviceable and rigid ~~liferaft~~ for boarding by the remainder of the ~~occupants~~. Similarly, a ~~maximum environmental temperature~~ to which the ~~liferaft~~ assembly may be exposed and still remain in a seaworthy ~~condition~~ upon inflation ~~must~~ be determined. The temperature limitations ~~must~~ be submitted to the FAA and ~~liferaft~~ purchaser in accordance with the data ~~requirements~~ of this TSO.

6.2.5.1 Test Procedure. The packed ~~liferaft~~ assembly with its inflation bottles installed ~~must~~ be exposed to each of the above temperatures for not less than 24 hours and ~~must~~ be inflated within 5 minutes after ~~removal~~ from such temperatures. The ~~liferaft must be allowed~~ to return to a temperature of approximately 70 ± 5 degrees Fahrenheit before ~~being~~ deflated, repacked, and ~~subjected~~ to a second exposure. After the above tests have been ~~completed~~, the ~~liferaft must~~ be able to pass tests required by paragraphs 6.2.1 and 6.2.2 of this standard.

